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## **Perplexing PFA**

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### **KEYWORDS**

Plain film of abdomen, retained barium, haemodialysis, lanthanum carbonate

## **CLINICAL PRESENTATION**

A 62 year-old male presented to hospital with generalized abdominal pain of long standing duration. His background medical history was notable for end-stage kidney disease (ESKD) secondary to focal segmental glomerulosclerosis for which he required hemodialysis three times per week. Esophagogastroduodenoscopy, optical colonoscopy, barium meal and enema studies in the previous two years were normal apart from the detection of a small hiatus hernia. Physical exam revealed diffuse abdominal tenderness without guarding, rebound or focal tenderness. There was no palpable organomegaly or intraabdominal mass. The patient's medications included alfacalcidol 0.25 mcg once per day (od), sevelamer hydrochloride 800 mg three times per day (tds), lanthanum carbonate 1000 mg tds, omeprazole 40 mg od as well as medications for hypertension and anxiety. Due to the persistent nature of his abdominal discomfort, a plain film of the abdomen (fig 1a) was performed and compared with a radiograph performed one year earlier (fig 1b).

## **QUESTION**

What are the major imaging findings on the PFA and based on the patient's history, what is the most likely explanation for the PFA finding?

## ANSWER

Plain film of abdomen (fig 1) depicts numerous 5-10 mm foci of increased density, which are located in the anatomic path of the colon which were not present on the previous exam (fig 1b). The explanation for these imaging findings was not immediately apparent.

Analysis of the patient's imaging records revealed that a barium enema had been performed 30 months prior to the abdominal radiograph which demonstrated the opacities. Review of the earlier abdominal radiograph (Fig 1b) showed normal appearances with no focal hyperdensities present in the colon. Treatment with lanthanum carbonate had been commenced six months after the initial normal PFA. Following a literature review, we concluded that the interval development of focal hyperdensities within the colon in the 12 month interval between the two PFA's, was explained by the formation of lanthanum bound plaques of phosphate within the colon. These angular hypersensities could easily have been wrongly attributed to retained barium in the colon, had a review of previous imaging studies been omitted.

An imaging feature of lanthanum particles on plain abdominal radiography in patients on continuous lanthanum treatment, is that the focal hyperdensities observed change position between imaging studies, whereas retained barium has a globular appearance and long-term retention is usually confined to colonic diverticulae<sup>1</sup>. The finding that the lanthanum plaques move between PFA's has clinical implications and suggests patient compliance with medication and there have been proposals in the nephrology literature that regular PFA's can be used as a means of monitoring patient compliance with medications.<sup>1</sup>

Patients with ESKD receiving haemodialysis develop hyperphosphataemia due to impaired phosphate excretion which increases their risk of renal bone disease and cardiovascular disease.<sup>2</sup>

High serum [phosphate] combined with low serum [calcium] secondary to lack of vitamin D induces secondary hyperparathyroidism.<sup>2</sup> Lanthanum carbonate is a trivalent rare-earth element which tightly binds phosphate inhibiting absorption through the gastrointestinal resulting in excretion through the colon.<sup>3</sup>

The imaging findings on PFA in patients on lanthanum therapy are not widely appreciated. This case report is written to highlight typical imaging findings associated with ingestion of lanthanum and to reduce potential for diagnostic uncertainty which can arise, when these peculiar imaging findings on PFA are encountered. It is also important to highlight the importance of referring physicians providing information regarding lanthanum carbonate ingestion, when requesting a PFA.

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**Competing Interest:**

There are no competing interests to declare.

## FIGURE LEGEND

**Figure 1** (A and B) Plain films of abdomen performed at presentation (fig 1a) and one year earlier (fig 1b). There are multiple hyperdensities in the distribution of the colon due to ingested lanthanum carbonate which were not present following the barium enema but which developed following lanthanum carbonate ingestion.

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